

USSN 10/077,554

Response After Final

Amendments to the Claims

Please amend the claims as follows:

1. (currently amended) A semiconductor device comprising:
a substrate; and
a ~~stiffener~~-molded stiffener being molded onto and secured to the substrate without attachment with an adhesive element.
2. (original) The device of Claim 1, wherein the substrate is selected from a group consisting of a laminated polymer, a polyimide layer, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame.
3. (original) The device of Claim 1, wherein the substrate has a thickness of less than about 75 microns.
4. (original) The device of Claim 1, wherein the substrate has a thickness of less than about 50 microns.
5. (original) The device of Claim 1, wherein the substrate has a thickness of less than about 35 microns.
6. (original) The device of Claim 1, wherein the stiffener has a thickness of less than about 100 microns.
7. (original) The device of Claim 1, wherein the stiffener has a thickness of less than about 75 microns.
8. (original) The device of Claim 1, wherein the stiffener has a thickness of less than about 50 microns.

USSN 10/077,554

Response After Final

9. (currently amended) The device of Claim 1, wherein the molded stiffener comprises a thermoplastic material.
10. (original) The device of Claim 1, wherein the molded stiffener comprises a thermosetting polymeric material.
11. (original) The device of Claim 1, wherein the thermal coefficient of expansion of the molded stiffener and the substrate correspond such that heating expands both the molded stiffener and the substrate approximately equally.
- 12-15. (canceled)
16. (original) The device of Claim 1, wherein the molded stiffener comprises at least one cross member.
17. (original) The device of Claim 1, wherein the molded stiffener is in a form selected from the group consisting of a grid, a lattice, a grille, and a web.
18. (canceled)
19. (original) The device of Claim 1, wherein the molded stiffener is sized to correspond to at least one of a length and a width of the substrate.
20. (canceled)
21. (currently amended) The device of Claim 1, wherein the molded stiffener ~~forms~~ is structured as an enclosure for receiving containing an encapsulating material therein.
22. (original) The device of Claim 1, wherein the substrate comprises index holes.

USSN 10/077,554

Response After Final

23. (currently amended) The device of Claim 1, wherein, ~~prior to the stiffener being molded to the substrate,~~ the substrate is in reel form.

24. (currently amended) A semiconductor device comprising:
a substrate comprising a first surface, a second surface, and a periphery; and
a ~~stiffener~~ molded stiffener secured to the first surface of the substrate proximate the periphery; the molded stiffener being molded onto and secured to the substrate without attachment with an adhesive element.

25. (original) The device of Claim 24, wherein the stiffener protrudes from the first surface of the substrate.

26. (currently amended) The device of Claim 24, wherein the first surface of the substrate comprises a recess ~~formed therein, and the stiffener being molded~~ stiffener is secured to the substrate within the recess.

27. (currently amended) The device of Claim 26, wherein the molded stiffener is ~~flush about~~ level with the first surface of the substrate.

28. (original) The device of Claim 24, wherein the molded stiffener comprises at least one cross member.

29. (currently amended) A semiconductor device comprising:
a substrate comprising a first surface and a second surface;
a first stiffener being molded onto and secured to the first surface of the substrate without attachment with an adhesive element; and
a second stiffener being molded onto and secured to the second surface of the substrate without attachment with an adhesive element.

30. (original) The device of Claim 29, wherein the first stiffener and the second stiffener comprise different configurations.

USSN 10/077,554

Response After Final

31. (original) The device of Claim 29, wherein the first stiffener and the second stiffener comprise different dimensions.
32. (currently amended) The device of Claim 29, wherein one of the first stiffeners protrudes from the first surface of the substrate, and the other of the second stiffeners is disposed situated within a recess within the substrate and flush with the second surface of the substrate.
33. (canceled)
34. (currently amended) A semiconductor assembly comprising:
a substrate having a first surface, a second surface, and a periphery;
a die disposed situated on the first surface of the substrate; and
a stiffener being molded onto and secured to the first surface of the substrate without attachment with an adhesive element.
35. (currently amended) The assembly of Claim 34, wherein the stiffener is disposed situated at the periphery of the substrate.
36. (currently amended) The assembly of Claim 35, further comprising a second stiffener being molded onto and secured to the second surface of the substrate without attachment with an adhesive element and a second die disposed on the second surface of the substrate.
37. (currently amended) The assembly of Claim 34, wherein the substrate is selected from a group consisting of a laminated polymer, a polyimide layer film, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame.
38. (withdrawn) A semiconductor die package comprising:
a substrate comprising a first surface, a second surface, and a periphery;
a die disposed situated on the first surface of the substrate within the periphery;

USSN 10/077,554

Response After Final

a ~~stiffener~~ molded stiffener secured to the first surface of the substrate without adhesive attachment at the periphery; and

an encapsulating material at least partially covering the die.

39. (withdrawn) The package of Claim 38, wherein the substrate is selected from a group consisting of a laminated polymer, a polyimide layer, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic, and a metal frame.

40. (canceled)

41. (withdrawn) The package of Claim 38, wherein the encapsulating material is at least partially bounded bordered by the molded stiffener.

42. (withdrawn) The package of Claim 38, wherein the package comprises a second stiffener secured to the second surface of the substrate.

43. (withdrawn) The package of Claim 42, wherein the second stiffener is molded and secured to the second surface of the substrate without adhesive attachment.

44. (currently amended) A method of securing a stiffener to a substrate, comprising the steps of:

providing a stiffener material and the substrate, the substrate comprising a first surface, a second surface, and a periphery;

molding applying the stiffener material onto the first surface of the substrate proximate the periphery; and

permitting hardening the stiffener material to harden to form a molded stiffener, wherein the molded stiffener is secured to the substrate without attachment with an adhesive element.

USSN 10/077,554

Response After Final

45. (currently amended) The method of Claim 44, wherein the step of ~~molding~~ applying the stiffener material comprises a molding process selected from the group consisting at least one of transfer molding, injection molding, and spray molding.

46. (currently amended) The method of Claim 44, wherein the step of ~~molding~~ applying the stiffener material comprises applying an encapsulating material to the substrate ~~to form the molded and molding the encapsulating material into the~~ stiffener.

47. (currently amended) The method of Claim 44, wherein the step of hardening comprises at least one of heating the stiffener material, ~~permitting cooling the stiffener material to cool,~~ curing the stiffener material by means of a catalyst, and curing the stiffener material by exposure to radiation.

48. (currently amended) A method of ~~molding~~ securing a stiffener to a lead frame assembly, comprising the steps of:

providing the lead frame assembly, the lead frame assembly comprising a substrate having a first surface, a second surface, and a periphery, and two or more die ~~disposed~~ situated on the first surface of the substrate;

providing a stiffener material;

molding the stiffener material onto the first surface of the substrate to form a molded stiffener secured to the substrate without attachment with an adhesive element; and

singulating the lead frame assembly[;] having the molded stiffener situated thereon, to separate the two or more die.

49. (currently amended) The method of Claim 48, further comprising, prior to the singulation step, the step of encapsulating at least a portion of the two or more die ~~disposed~~ situated on the lead frame assembly.

50. (currently amended) The method of Claim 49, wherein the stiffener material is molded onto the substrate to provide a boundary at least partially around the die on the substrate, the encapsulating step comprises dispensing an encapsulating material onto the die, and the molded

USSN 10/077,554

Response After Final

stiffener is structured to ~~provides at least one boundary to~~ contain the encapsulating material ~~therein within said boundary.~~

51. (withdrawn) A method of forming a semiconductor die package, comprising the steps of:
securing a die to a first surface of a substrate;

molding a stiffener material onto the first surface of the substrate to form a molded stiffener thereon such that the stiffener is secured to the substrate without attachment with an adhesive element; and

encapsulating the die and the molded stiffener with an encapsulating material to form the semiconductor die package.

52. (withdrawn) The method of Claim 51, wherein the step of encapsulating comprises ~~inserting~~ positioning the substrate with the die and the molded stiffener ~~disposed~~ situated thereon ~~into an opening between two mold plates,~~ and removing the package from the mold plates after the encapsulating material has hardened.

53. (withdrawn) A method of forming a semiconductor die package comprising the steps of:
mounting a die on a first surface of a lead frame;

molding a stiffener onto the first surface of the lead frame such that the stiffener is secured to the substrate without attachment with an adhesive element;

applying an encapsulating material to the die and the stiffener; and
~~permitting~~ hardening the encapsulating material ~~to harden~~ to produce the semiconductor die package.

54. (withdrawn) The method of Claim 53, wherein the molded stiffener provides at least one of stiffening the lead frame, and increasing rigidity of the lead frame.

55. (currently amended) A semiconductor device, comprising:
a substrate comprising first and second surfaces, and a periphery; and

USSN 10/077,554

Response After Final

a molded thermoplastic material ~~molded~~ secured on the substrate proximate the periphery without attachment with an adhesive element, the molded material structured to stiffen the substrate.

56. (currently amended) A semiconductor device, comprising:
a substrate comprising first and second surfaces, and a periphery;
a molded thermoplastic material ~~molded~~ secured on the substrate proximate the periphery without attachment with an adhesive element, the molded material structured to stiffen the substrate, and
a die mounted on the first surface of the substrate.

57. (currently amended) A semiconductor device, comprising:
a substrate comprising first and second surfaces, and a periphery;
a molded thermoset plastic material ~~molded~~ secured on the substrate proximate the periphery without attachment with an adhesive element, the molded material structured to stiffen the substrate, and
a die mounted on the first surface of the substrate.

58. (currently amended) A semiconductor device, comprising:
a substrate comprising first and second surfaces, and a periphery;
a thermoplastic material molded onto and secured to ~~on~~ the substrate without attachment with an adhesive element, the molded material situated proximate the periphery and structured to stiffen the substrate, and
~~means for handling an element situated along the periphery of the substrate and structured for engagement with by a processing mechanism, said handling means disposed along the periphery of the substrate for transporting the substrate.~~

59. (currently amended) The device of Claim 58, wherein the ~~handling means~~ engagement element comprises a plurality of index holes proximate the periphery of the substrate.

USSN 10/077,554

Response After Final

60. (previously presented) The device of Claim 58, wherein the substrate comprises a lead frame.
61. (currently amended) A semiconductor device, comprising:
a lead frame comprising first and second surfaces, and a periphery;
a thermoplastic material molded onto and secured to ~~along the periphery~~ of the lead frame along the periphery to stiffen the lead frame, and
a plurality of index holes proximate the periphery of the substrate and structured for handling the lead frame by a processing mechanism.
62. (currently amended) A method of forming a semiconductor device, comprising the steps of:
providing a substrate comprising first and second surfaces, and a periphery; and
molding a stiffening material onto the first surface of the substrate proximate the periphery to form a stiffener being molded onto and secured to the substrate without attachment with an adhesive element.
63. (currently amended) A method of forming a semiconductor device, comprising the steps of:
providing a substrate comprising first and second surfaces, and a periphery;
applying a stiffening material onto the first surface of the substrate proximate the periphery by a molding process to form a molded stiffener that is secured to the substrate without attachment with an adhesive element; and
hardening the stiffening material on the substrate.
64. (previously presented) The method of Claim 63, wherein the step of applying the stiffening material comprises a transfer molding process.
65. (previously presented) The method of Claim 63, wherein the step of applying the stiffening material comprises a injection molding process.

USSN 10/077,554

Response After Final

66. (previously presented) The method of Claim 63, wherein the step of applying the stiffening material comprises a spray molding process.
67. (previously presented) The method of Claim 63, wherein the stiffening material comprises a thermoplastic material.
68. (previously presented) The method of Claim 63, wherein the stiffening material comprises a thermosetting polymeric material.
69. (previously presented) The method of Claim 63, wherein the step of hardening the stiffening material comprises heating the stiffening material.
70. (previously presented) The method of Claim 63, wherein the step of hardening the stiffening material comprises cooling the stiffening material.
71. (previously presented) The method of Claim 63, wherein the stiffening material comprises a catalyst, and the step of hardening the stiffening material comprises curing the stiffening material.
72. (previously presented) The method of Claim 63, wherein the step of hardening the stiffening material comprises curing the stiffening material by exposure to a radiation.
73. (currently amended) A method of forming a semiconductor device, comprising the steps of:
- providing a substrate comprising first and second surfaces, and a periphery;
 - applying a flowable stiffening material onto the first surface of the substrate proximate the periphery;
 - hardening the stiffening material on the substrate to form a molded stiffener that is secured to the substrate without attachment with an adhesive element; and
 - mounting a die on the first surface of the substrate.

USSN 10/077,554

Response After Final

74. (currently amended) A method of forming a semiconductor device, comprising the steps of:

providing a substrate comprising first and second surfaces, and a periphery;
molding a plastic material onto the first surface of the substrate proximate the periphery;
hardening the plastic material on the substrate to form a molded stiffener that is secured to the substrate without attachment with an adhesive element; and
mounting a die on the first surface of the substrate.

75. (previously presented) The method of Claim 74, wherein the step of molding comprises a process selected from the group consisting of transfer molding, injection molding, and spray molding.

76. (previously presented) The method of Claim 67, further comprising encapsulating at least a portion of the die.

77-84. (canceled)

85. (new) A semiconductor device comprising: a molded stiffener being molded onto and secured to a substrate without attachment with an adhesive element.